

Family Information

Scott Elementary
STEM Fair

2027



STEM Fair: Why?

Purpose of a STEM Project

- **Integration of Knowledge:** Students integrate and apply concepts learned throughout their STEM and academic coursework to a complex problem in an area of personal passion.
- **Problem-Solving:** The projects are designed to challenge students to identify real-world problems and develop practical, innovative solutions using their STEM skills.
- **Skill Development:** Students develop critical thinking, independent learning, research, design, and presentation skills.
- **Career Preparation:** The experience provides valuable hands-on experience allowing them to develop public speaking, research, time management, and perseverance, thus preparing students for the workforce or higher education.



Types of Projects

Students can choose from 3 basic types of projects

- **Engineering / Robotics / Technology:** Find a solution to a real world problem by creating a product to solve the problem.
- **Mathematics:** Use mathematics to solve a problem.
- **Science Experiment:** A controlled test to discover something unknown, test a principle, or support or disprove a hypothesis.



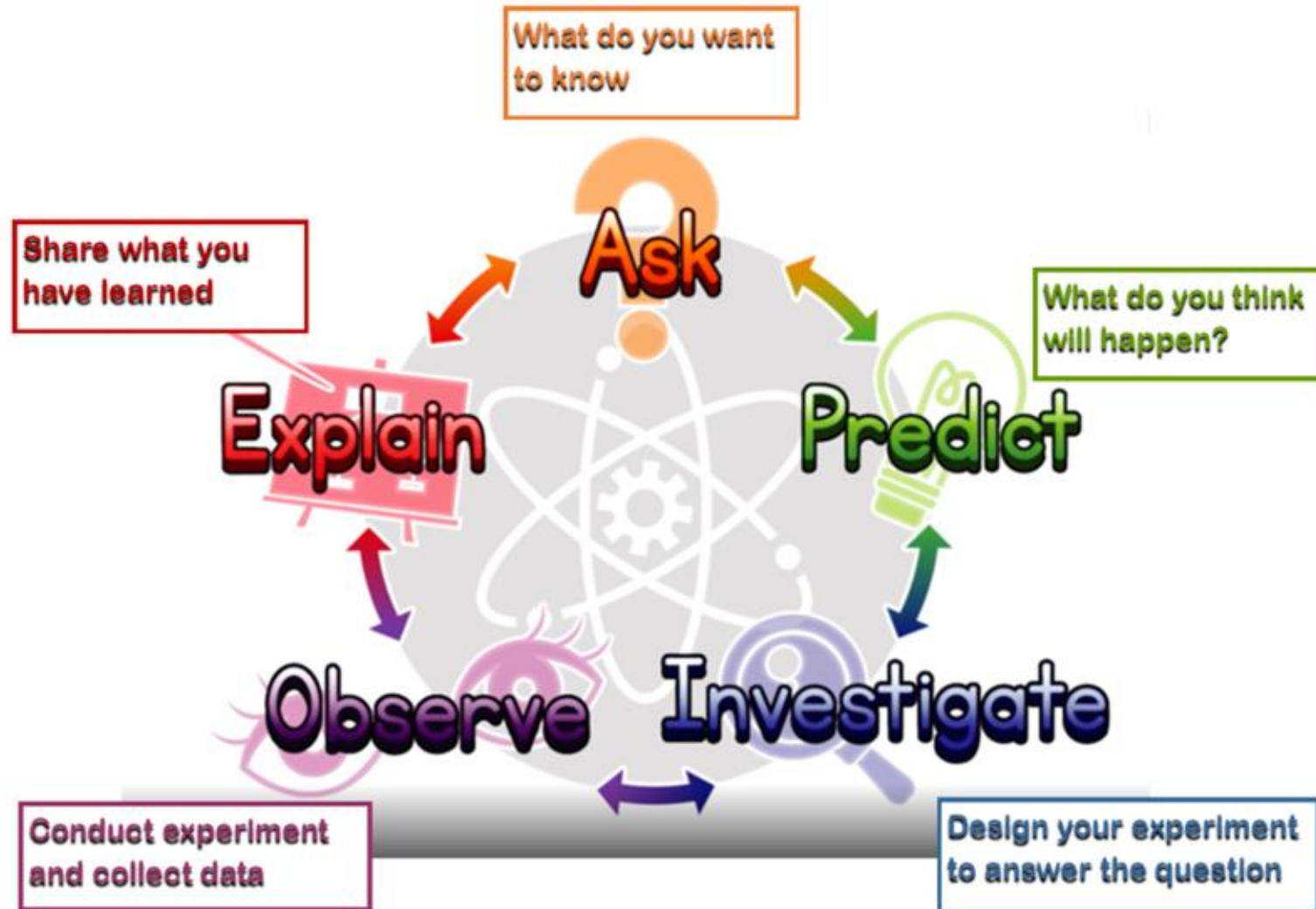
Science Experiment Information

The goal is for students to learn something new and practice problem solving through the Scientific Inquiry Process.

- The science experiment should **NOT** be something they already know the outcome.
- Students need to design their own experiment, not follow a “canned” experiment. They can look at pre-made experiments as part of their background research to get ideas, but they should create their own variation.

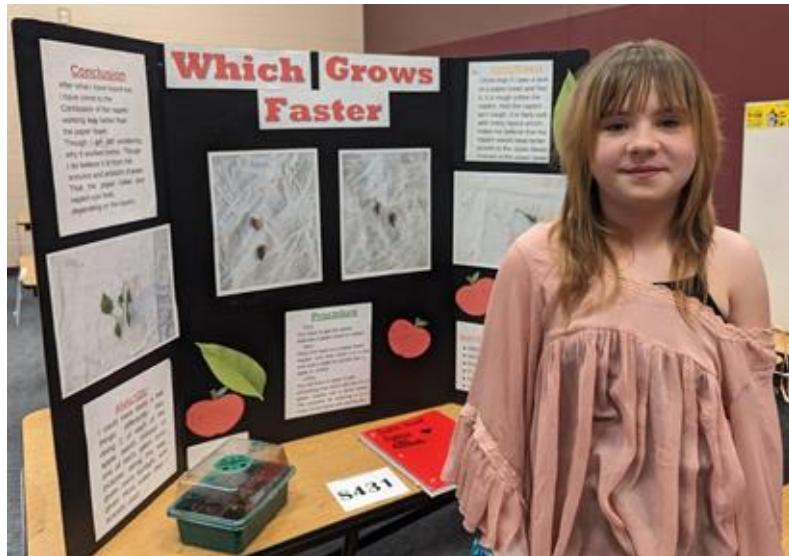
Step by step instructions for completing a scientific investigation is located on The Scott website under the STEM tab and Resources. There will also be assignments in the red folder in the Schoology STEM/PLTW course.

Scientific Inquiry Process



Science Experiment vs. Demonstration

- Students that choose this option will complete a science experiment NOT a demonstration or research report.
- An experiment will always center around a question that **cannot** be answered with a simple yes or no or be found by searching the internet.



Science Experiment vs. Demonstration Examples

Science Experiment A science experiment has variables, tests different materials, and generates data.	Science Demonstration: A science demonstration shows how something works. Do not do a demonstration.
Examples: Which brand of batteries lasts the longest when connected to a lightbulb using a simple circuit?	<del> Examples: Create a circuit to show how electricity lights a light bulb. </del>
How do the amounts of baking soda and vinegar affect the volume of bubbles created?	<del> Build a model volcano that uses baking soda and vinegar "lava". </del>
What slime recipe will create slime that can stretch the furthest?	<del> Show how to make slime. </del>
How does rocket shape affect flight height?	<del> Create a report on the Artemis mission. </del>

Science Categories

BIOLOGICAL SCIENCE - living systems or organisms

- Topics may include plant or animal biology, ecosystems, environmental relationships, or the study of fungi, or protozoa.

Examples

Does seed size affect plant height?

Do different colors of light affect the direction of plant growth?

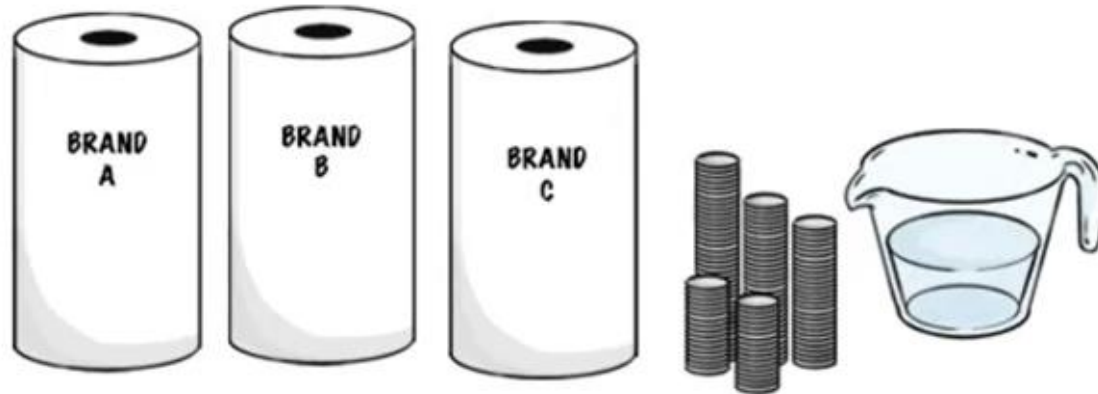


How does the amount of sugar in a yeast solution affect the amount of CO₂ gas released?

Science Categories

CONSUMER SCIENCE - product evaluation or comparison

- Topics may include product performance, environmental impact, waste reduction, or sustainability considerations.



Example

Which brand of paper towel is the strongest when wet?

Science Categories

HEALTH AND BEHAVIORAL SCIENCE - human or other organism health, habits, learning, or behavior

- Topics may include hygiene, cognitive tasks, wellness, social interactions, or responses to environmental conditions.

Example

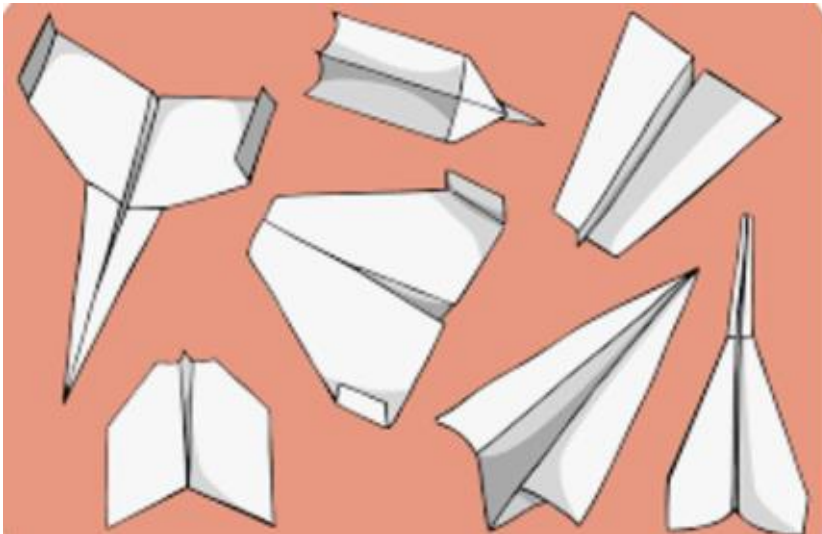
Does liquid or bar soap
clean hands better?



Science Categories

PHYSICAL SCIENCE - non-living systems or natural physical processes

- Topics may include changes in matter, energy, weather, astronomy, geology, magnetism, electricity, heat, light, and sound.



Example
Which paper
airplane design
travels the furthest
distance?

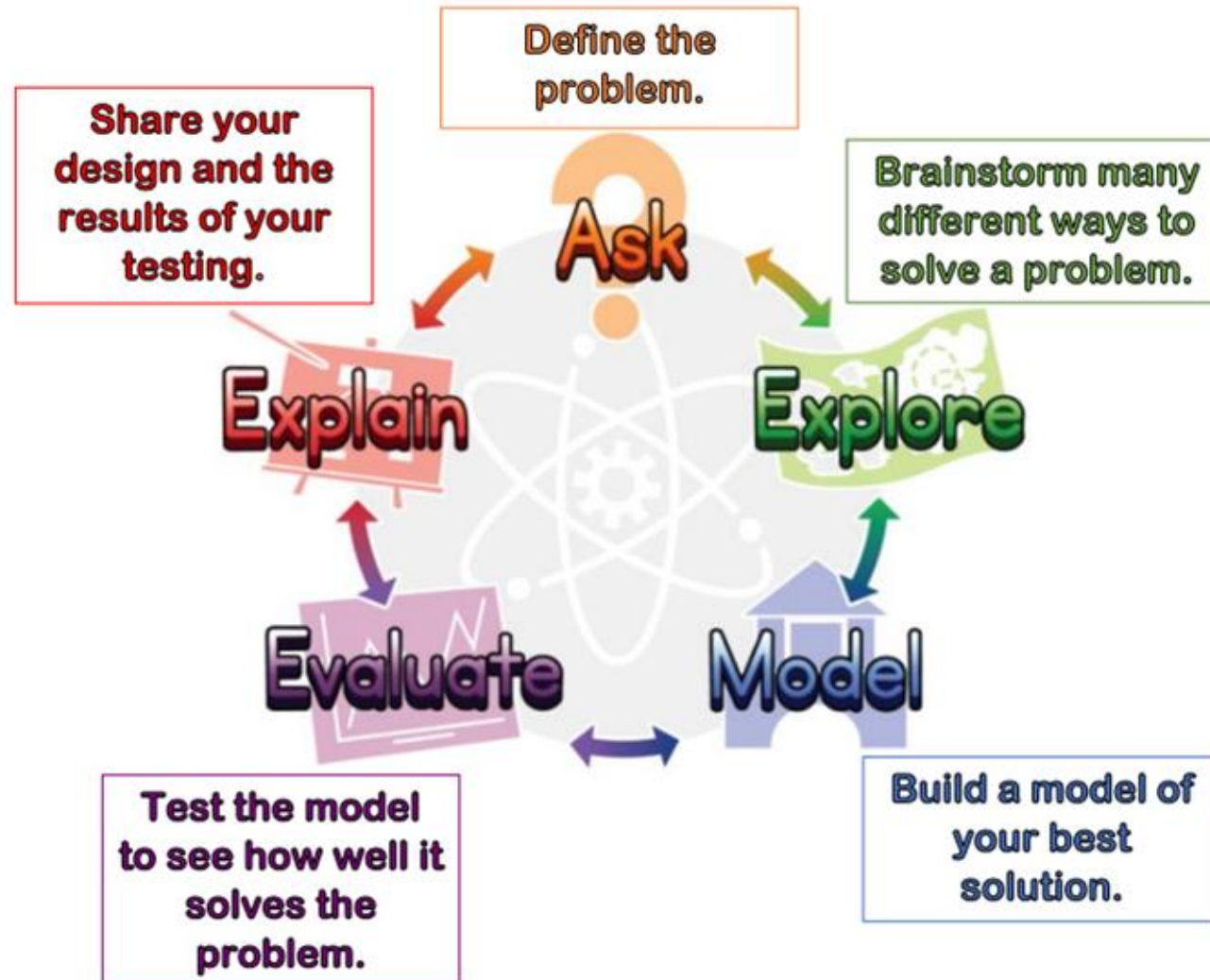
Technology Engineering Math Information

The purpose is for students to learn something new and practice problem solving through the Design Process.

- Technology, Engineering, and Math projects should solve a problem in the student's life or real world.
- Students need to design their own product or modify a product, not copy an existing product. They can look at current products that solve the same or similar problem as part of their background research to get ideas, but they should create their own variation.

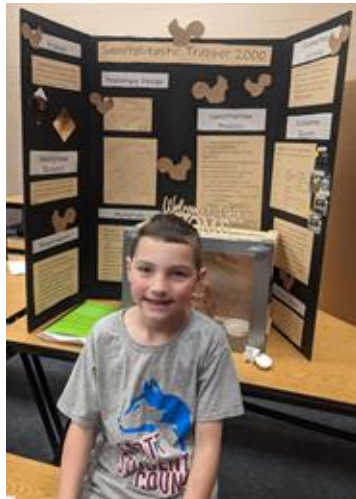
Step by step instructions for completing a Technology, Engineering or Math investigation is located on The Scott website under the STEM tab and Resources. There will also be assignments in the red folder in the Schoology STEM/PLTW course.

Technology Engineering Math Design Process



Technology Engineering Math Projects vs. Demonstrations

- Students that choose these **projects** will design a new, or modify an existing product, **NOT** demonstrate how a product works.
- An technology and engineering projects will always center around solving a problem by creating an object to solve the problem, **not** by searching the internet for a solution.
- Math projects use math to solve a real world problem.



Technology Categories

COMPUTER SCIENCE - create solutions to problems using a variety of technologies.

- Topics include computer hardware, software / app / game design, networking technologies, and artificial intelligence.

Example

Problem: My reaction time is not fast enough when playing video games

Product: Code a Scratch game that increases my reaction time



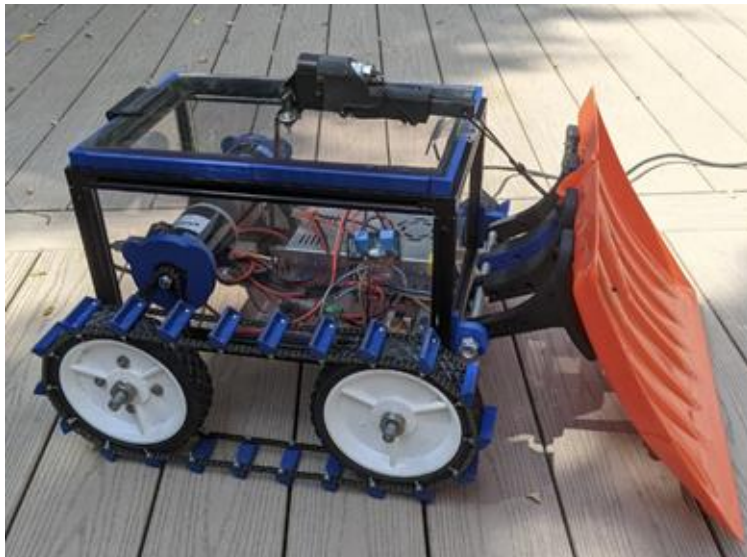
Computer Science Project vs. Demonstration Examples

Computer Science Projects	Computer Science Demonstrations
Creates solutions to problems through designing or modifying apps or hardware devices.	Shows how to play a computer game or how hardware works.
Problem - Studying math facts is boring. Product - Create a computer game using SCRATCH programming language to practice math facts.	Show people how to play Minecraft.
Problem - The WIFI signal in my bedroom is very weak. Product - Modify the antenna on our WIFI router to improve signal strength in my room.	Demonstrate how to set up a WIFI router.

Technology Categories

ROBOTICS - designing, improving, or using robots / drones to solve a problem.

- Topics include control systems, machine/human interface, or biomechanics / prosthetics.



Example

Problem: I hate to shovel snow.

Product: Build a robot that can shovel snow.

Robotics Project vs. Demonstration Examples

Robotics Projects	Robotics Demonstrations
Designs or improves robotic devices that solves a problem to make life better	Shows how robots work
Problem - My remote control jeep can't climb steep dirt hills. Product - Build a new set of gears to allow the remote controlled jeep to climb steeper hills.	~~Drive the remote controlled jeep around the classroom.~~
Problem - Our family dislikes green Skittles. Product - Build a robotic device to sort out the green Skittles.	~~Show a video on how Skittles are made.~~

Engineering Category

ENGINEERING DESIGN - create, design, or improve a device, tool, process, or material to solve a problem.

- Topics include building prototypes, modeling solutions, testing structural designs, or optimizing performance.

Example

Problem: Snow builds up on road signs.

Product: Design a product that repels snow on aluminum.



Engineering Project vs. Demonstration Examples

Engineering Projects	Engineering Demonstrations
Designs objects that solves a problem to make life better	Shows how something works
<i>Examples:</i> Problem - Student Water bottles keep falling off their desk or get knocked over on the floor and spilling water. Product - Design and build a prototype of a water bottle holder that fits on a desk or chair to prevent them from getting knocked over.	<i>Examples:</i> Make a video of how water bottles are made.
Problem - New baseballs must be prepared for game play by rubbing mud on baseballs gets your hands dirty. Product - Use Legos to design and build a device that can apply the mud without getting your hands dirty.	Create a Presentation on why mud is applied to baseballs in the major and minor leagues.

Mathematics Category

MATHEMATICS - application of mathematics to solve a problem

- Topics may include analysis, probability, or statistics, to solve a problem.



Example

Problem: Is a coin toss really fair?

Calculate the probability of each outcome.

Mathematics Project vs. Demonstration Examples

Mathematics Projects	Mathematics Demonstrations
Applies mathematics to solve a problem to make life better	Shows how mathematics works
Problem - Our school gets all of its electricity from the local utility company. Product - Calculate the number of solar panels that would be required to produce 100% of our schools average electrical needs.	~~Explain how solar panels work.~~
Problem - Students love candy but have limited money to buy candy. Product - Determine what candy give customers the most quantity per dollar, and thus the best value.	~~Demonstrate how to find the area of a quadrilateral.~~

What does my student need to do?

Science Experiment

- Use the *Scientific Inquiry Process* to design and perform a scientific experiment.
- Collect data.
- Interpret data and make a conclusion.
- Make a display board summarizing the experiment, results, and conclusions.
- Present the project to guest judges at the Scott STEM Fair **January 22, 2027. This is during the school day.**
- Parents and the community will be able to view the projects the night of **January 22, 2027.**

Technology/Engineering/Math Project

- Determine a problem.
- Use the *Design Process* to design, construct, and test a working product prototype that solves the problem.
- Make a display board summarizing the product prototype, results, and conclusions.
- Present the project to guest judges at the Scott STEM Fair **January 22, 2027. This is during the school day.**
- Parents and the community will be able to view the projects the night of **January 22, 2027.**

Adult Support

Teachers, parents, and mentors may:	Adults may not :	Required Adult Supervision
● Explain scientific concepts ● Demonstrate safe tool use ● Review materials for safety ● Help students think through problems	● Build or assemble the project ● Create the display ● Collect data on behalf of the student	● Cutting tools ● Electrical construction ● Heat sources used at home ● Testing involving human subjects ● Activity with potential risk

Safety Restrictions

Human Participants

Projects involving people must involve no more than minimal risk, similar to normal school activities.

- Examples of allowed minimal-risk activities:
 - Anonymous surveys about habits or preferences
 - Memory or sorting tasks
 - Simple reaction-time activities

Human participants must remain anonymous. Participants must be assigned a non-identifiable code in all data tables and in the data notebook. Students may not display:

- Names
- Photos of participants
- Videos
- Contact information
- Personal identifiers

All human subjects under the age of 18 must have signed parent/guardian permission to participate. All signed permission forms must be included in the data notebook and be available for review.

Safety Restrictions

Human Participants: Consent Form

Human Informed Consent Form

Instructions to the Student Researcher(s): An informed consent/assent/permission form should be developed in consultation with the Adult Sponsor, Direct Supervisor or Qualified Scientist.

This form is used to provide information to the research participant (or parent/guardian) and to document written informed consent, minor assent, and/or parental permission.

- When written documentation is required, the researcher keeps the original, signed form.
- Students may use this sample form or may copy ALL elements of it into a new document.

If the form is serving to document parental permission, a copy of any survey or questionnaire must be attached.

Student Researcher(s): _____

Title of Project: _____

I am asking for your voluntary participation in my science fair project. Please read the following information about the project. If you would like to participate, please sign in the appropriate area below.

Purpose of the project:

If you participate, you will be asked to:

Time required for participation:

Potential Risks of Study:

Benefits:

How confidentiality will be maintained:

If you have any questions about this study, feel free to contact:

Adult Sponsor/QS/DS: _____ Phone/email: _____

Voluntary Participation:

Participation in this study is completely voluntary. If you decide not to participate there will not be negative consequences. Please be aware that if you decide to participate, you may stop participating at any time and you may decide not to answer any specific question.

By signing this form I am attesting that I have read and understand the information above and I freely give my consent/ assent to participate or permission for my child to participate.

Adult Informed Consent or Minor Assent

Date Reviewed & Signed: _____
(mm/dd/yy)

Research Participant Printed Name: _____

Signature: _____

Parental/Guardian Permission (if applicable)

Date Reviewed & Signed: _____
(mm/dd/yy)

Parent/Guardian Printed Name: _____

Signature: _____

Safety Restrictions

Biological Materials

No projects are allowed that involve potentially hazardous microorganisms (including bacteria, viruses, viroids, rickettsia, fungi, cyanobacteria, and parasites) and recombinant DNA (rDNA) technologies.

All observations of animals must be humane and non-intrusive. No procedures may cause distress, harm, or deprivation.

No live, dead, preserved, dried, or stored organisms may be displayed at the fair. This includes:

- Animals or animal parts
- Insects
- Microorganisms (mold, bacteria, algae, yeast)
- Soil, pond water, compost
- Fresh produce or seeds
- Petri dishes or slides

Safety Restrictions

Hazardous Chemicals & Physical Hazards

The following may only be used in projects with adult supervision:

- Toxic, flammable, or corrosive chemicals
- Bleach stronger than household levels
- Acids or bases stronger than household vinegar/baking soda
- Combustible materials
- Pressurized gases
- Dry ice
- Sharp objects
- Sharp tools
- Pressurized devices
- Projectiles
- Items resembling weapons
- Anything capable of causing injury

Student projects are not allowed to use any DEA-controlled substances, prescription drugs, alcohol & tobacco, firearms and explosives, radiation, lasers, or vape devices.

Safety Restrictions

Electrical & Mechanical Safety

If electricity is used for a project:

- Only battery DC or 110-volt AC power may be used
- Maximum of 15 amperes
- Motors larger than 1/4 HP are prohibited

Electrical elements must include:

- Proper insulation
- A grounded or two-prong plug
- An easily accessible on/off switch
- No exposed wiring
- No homemade or open-blade switches

Wires must be securely fastened using insulated clips only. Nails, staples, and tacks are prohibited.

Batteries must be secure and leak-proof. Car batteries, wet-cell batteries, or modified battery systems are prohibited.

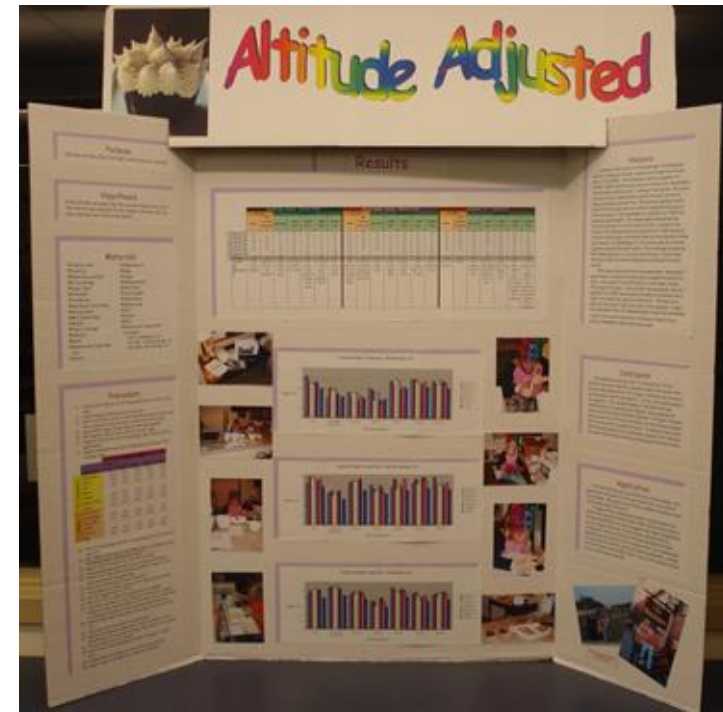
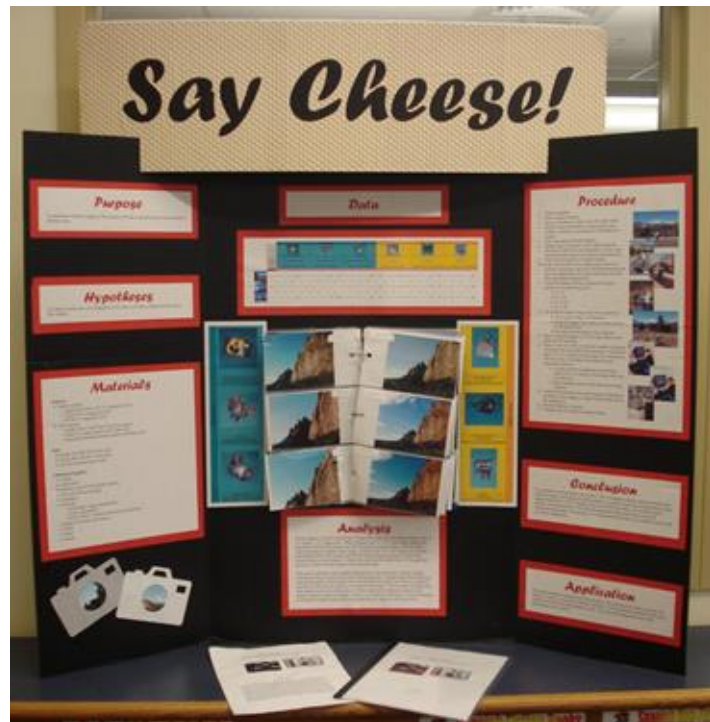
Prohibited Items & Materials at the STEM Fair

- | | |
|--|--|
| <ul style="list-style-type: none">● Aerosols● Apparatus with belts, pulleys, chains, or moving parts with tension or pinch points that are not appropriately shielded● Batteries with open-top cells or wet cells or battery packs over 100 watt-hour capacity● Biological materials of any kind. This includes:<ul style="list-style-type: none">○ Animals or animal parts○ Insects○ Microorganisms (mold, bacteria, algae, yeast)○ Soil, pond water, compost○ Fresh produce or seeds○ Petri dishes or slides● Dangerous tools● Drones or any flight-capable apparatus unless the propulsion power source removed | <ul style="list-style-type: none">● Food● Glass● Grease or oil● Hazardous chemicals or materials● High-pressure systems● Lasers● Open flames● Odor-producing materials● Powders● Sharp items (syringes, needles, pipettes, knives, etc.)● Sublimating solids such as dry ice or liquid nitrogen● Weapons, ammunition, reloading devices or replicas |
|--|--|

Traditional Display & Presentation

Traditional display boards will be used as the primary way to communicate information.

In addition to the display board the student will present their information in a 3-4 minute presentation for the judges.



Timeline

This is in the back of the Science & Engineering Fair notebook that was sent home with 5th graders and will give to interested 3rd and 4th graders. It is also on the Scott STEM Resources website.

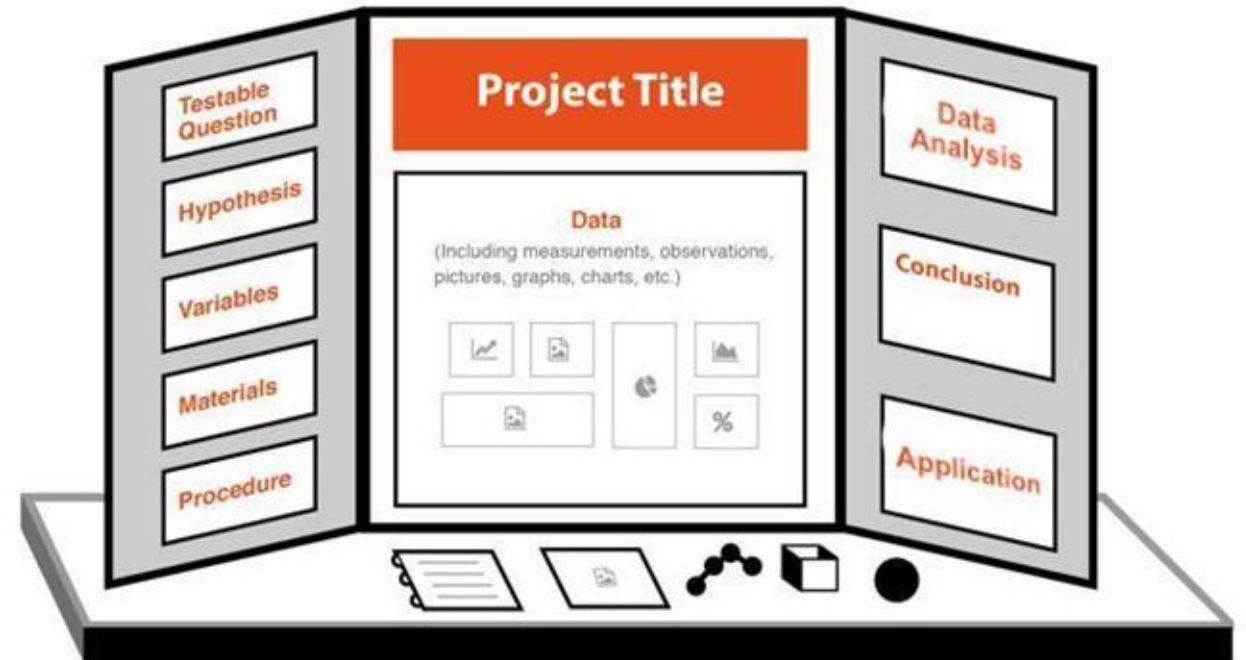
Week	Goal
9-14-26	9/15/26 STEM Project Information Meeting – Scott Library 6:00 pm, Project Overview, Project Resources, Notebook Setup
9-28-26	ASK - Brainstorm possible project topics and problems, Get Parent / Guardian Signature
10-5-26	ASK - Select final topic and create your testable question to solve.
10-12-26	PREDICT - Gather information on the topic. Generate a prediction to answer the testable question.
10-26-26	INVESTIGATE - Identify the independent, dependent, and controlled variables for the experiment.
11-2-26	INVESTIGATE - Create the procedure that will be used to conduct the experiment. <i>REMEMBER - you need a minimum of 3 trials.</i>
11-9-26	INVESTIGATE - Develop the list of materials needed for the experiment.
11-16-26 through 12-11-26	OBSERVE - Gather materials and conduct the experiment based on the procedure. Gather data and record findings. <i>REMEMBER - you need a minimum of 3 trials!</i> <i>NOTE: If you are measuring plant growth or conducting other experiments over time you may need to start earlier.</i>
12-14-26	EXPLAIN - Finalize data analysis. Use a spreadsheet program to create data tables and graphs to present information.
1-4-27	EXPLAIN - Use Claim – Evidence Based writing to create your conclusion.
1-11-27	EXPLAIN - Develop materials for your display board using a word processor. Print pictures and graphs.
1-18-27	EXPLAIN - Assemble the display board and practice a <u>3-4 minute</u> presentation.
1-22-27	STEM Fair at Scott Elementary during school hours. Required for 5th Grade
February	Regional STEM Fair at Tesla Center Invitation Only



Judging Criteria for Science Projects

Science Project Criteria

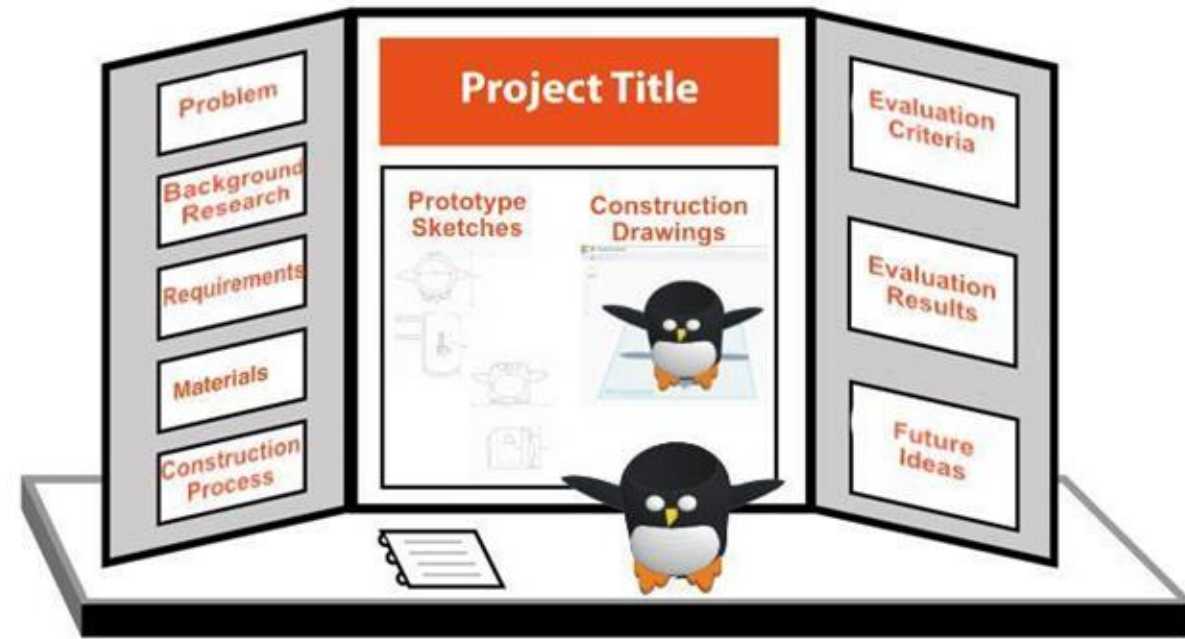
- Scientific Process
 - Testable Question
 - Hypothesis
 - Variables
 - Materials
 - Procedure
 - Data
 - Analysis
 - Conclusion
 - Application
- Presentation
 - Display - organized & attractive to audience
 - Display - student uses notebook and images to discuss findings and data
 - Oral Presentation Quality
- Time and Effort
 - Thoroughness
 - Effort



Judging Criteria for Engineering, Mathematics, and Technology Projects

Engineering, Math, and Technology Project Criteria

- Design Process
 - Problem addresses a real and specific need
 - Research is present
 - Requirements specified
 - Materials
 - Construction process
 - Prototype Sketches
 - Construction Drawings
 - Evaluation criteria
 - Evaluation results
 - Future ideas
- Presentation
 - Display - organized & attractive to audience
 - Display - student uses notebook and images to discuss findings and data
 - Oral Presentation Quality
- Time and Effort
- Thoroughness
- Effort



Need Help

Email

- shannon.collings-helfer@d11.org

Online

- STEM PLTW Schoology Course Red Folders
- Scott web STEMFair Resources
 - <https://scott.d11.org/stem/science-fair-resources>

School

- STEM Teacher Ms. Collings-Helfer
- Classroom Teachers



